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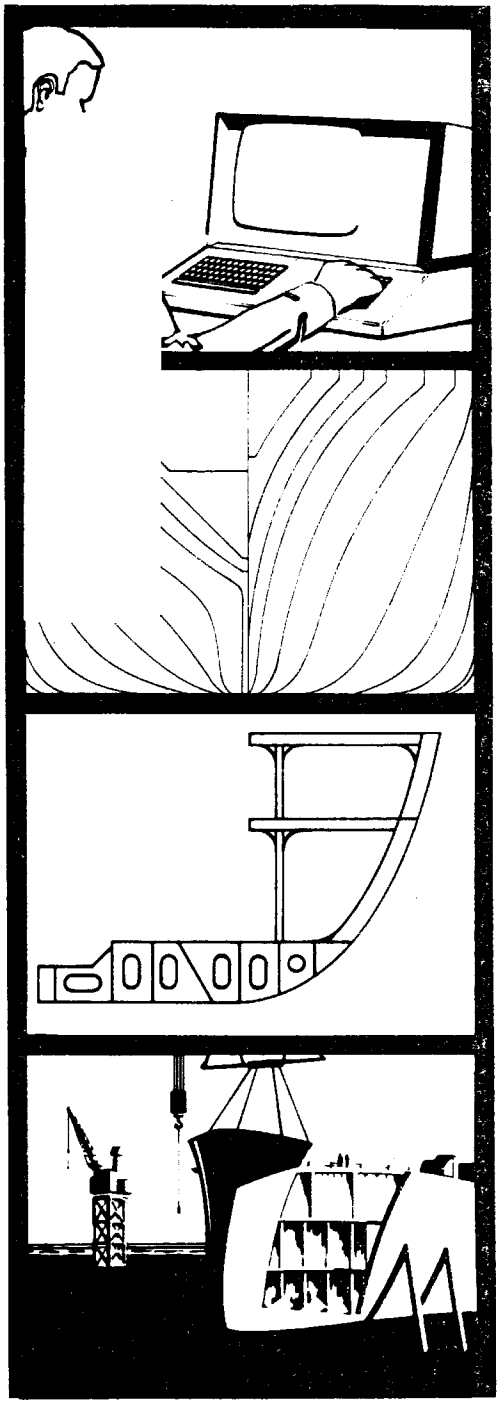

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SPECIAL INTEREST GROUP REPORTS

INTERACTIVE GRAPHICS FOR LOFTING AND DRAFTING

Douglas J. Martin

PRODUCTION CONTROL SYSTEMS

John C. Williams

PIPE DETAILING AND FABRICATION SYSTEMS

George P. Putnam

IIT Research Institute
Chicago, Illinois

INTERACTIVE GRAPHICS FOR LOFTING AND DRAFTING

This session centered on the current capabilities of several commercially available graphics systems in parts nesting and computer aided shipyard drafting. Three representatives of graphics system vendors participated on a panel to answer questions from the audience concerning their products' capabilities and graphics systems in general. These representatives were Dr. Robert Cowen of Computervision Corporation, Robert N. Hickox of Adage, Inc. and Lou Melancon of Auto-Trol Corporation. In addition, a representative of the Italian yard Italcantieri S.p.A. was on hand to relate that yard's experience in the use of Adage equipment for interactive nesting.

Of interactive nesting Italcantieri, in response to questions from the floor, has seen a reduction in nesting labor as a result of using their system from between 20,000 to 24,000 man-hours per year to 2000 man-hours per year. He further stated this effort represented the production of some 2500 nest tapes.

On the topic of system reliability the vendors reported uptimes for their systems in excess of 95%. The cost of these systems was also questioned. Without a clear description of the application, number of users, etc. of such a system, the vendors were able to respond only that the costs ranged from around $100,000 for a single user drafting system on up.

On the topic of computer aided design systems two members of the audience reported on the Navy's development efforts in this area. Two current applications cited in the Navy are a computer aided hull lines generation system employing interactive graphics and a graphics assisted ship's arrangements program.

PRODUCTION CONTROL SYSTEMS

This special interest group meeting was attended by 35-40 REAPS symposium participants. It was a free form meeting, and the direction of the discussion was provided entirely by the group. As a consequence, it delved into many areas that, by definition, were not truly production control systems. However, it brought out some very significant information related to production control systems for shipyards.

The initial discussion concerned the use of generalized production control systems. This discussion concluded that every shipyard is unique and has its own requirements for production control. The yard with 4000 employees has significantly different requirements than the yard with 500 employees. It was, therefore, concluded that every yard needs its own individual system.

Subsequent discussions centered on how a system should be designed. Currently, most systems are designed from the top or middle down. As a result, the system does an adequate job of satisfying middle and top organizational requirements. However, quite frequently it fails to address the needs of the man in the yard. Consequently, it was emphasized that a good system should be designed from the bottom up to maximize the information needed by the man in the yard. It was further pointed out that the system should maximize the use of the available resources. This point created some intense discussion on whether a system should maximize the use of available resources or control the amount of resources to be available. The group generally agreed that this would be a very desirable objective but difficult to achieve. To do this, it is imperative that the system be creditable and reliable to the yard man. Currently, budget estimates are sufficiently unreliable so that the yard man ''hedges his bet" by over estimating on the amount of resources required. It was noted that the process of designing a production control system is designing a change-in the way someone does his work. Consequently, you must give him a more reliable tool or he will continue to use his current tools which are time proven.

At this point the interest group made a very emphatic point. Production control systems demand good valid data as input or they are worthless. Judging

from the ensuing discussion current shipyard budget estimates do not provide reliable input data.

There was significant discussion concerning the responsibility for unreliable budget estimates. This was a relatively inconclusive discussion, however everyone did seem to agree that budget reliability has to start in the design process. In discussing the design problem the group made the following points:

The designer must know everything that went before to preclude re-inventing end cuts, brackets, etc. everytime one is needed.

Design drawings are prepared on a stem to stern basis not in modular form as the ship is built. The interpretation of these drawings is too frequently left to the yard man which further wastes his time and delays construction.

Bills of material are also prepared on a stem to stern basis with the same problems.

Desiqns must be prepared to satisfy the moduction practices of six or seven different shipyards each with their own individual preferences.

There was subsequent discussion on why these problems exist and how they might be alleviated:

Design agents are too far removed from the yards; they need to be much closer.

Yards should prepare their own detail drawings and bills of material to reflect internal practices to the maximum extent possible.

Yards should conduct production engineering reviews of every drawing before it goes to the yard.

Design agents have an entirely different set of problems from the yards, primarily in the area of time and cost.

In summary the following overall conclusions were reached:

Production control systems must be unique for every yard.

Production control systems demand reliable input.

Other system improvements are needed first:

- Budget reliability, production engineering reviews, and detail drawings consistent with yard practices.

Yards need the methodology to take advantage of similarities in their products.

- Every ship a yard builds is different, however there are significant similarities at the component level.

The proposed plan to be conducted within the REAPS program met with general acceptance. However, some comments seem pertinent:

- The scheduling system should be developed to balance:
  - the optimization of tool and equipment utilization
  - the maximization of production throughput with minimum work-in-process inventory.
- At least one European system provides for storing 200 programs at the machine to facilitate solving the above problem.
- It is planned to handle all pipe sizes and materials within the proposed facility:
  - different processing lines will be set up for different sizes
  - within each size range all materials will be handled on the same processing line.

The-development should take place module by module (i.e., racking, blast and painting, etc.) so that those modules with the largest potential pay-offs can be implemented first, and each yard can apply those modules or combinations of modules having the most cost appeal to it.

OTHER REMARKS

1) The current analysis calls for a 2-5 million dollar investment with a “less than five year” payback.

2) The blast and paint module appears to have a one year or less payback.

3) Some of the savings are independent of automating the pipe fabrication, for example, 60% of the welding can be converted from stick to wire.

4) Maximum advantage should be taken of related Navy developments.

The Newport News Pipe Detailing project is nearing completion. The next step appears to be to continue development at either the production or design end. The developer suggests the production end involving the feeding of pipe

geometry into a production control system and/or an inventory control system. At the design end the ground work has been laid for developing a system which permits designing from sketches and bypassing the manual drafting step.

There were several cormnents indicating that automated drafting packages are available and very cost effective.

Two major needs in systems were identified:

1. There is a need to perform dimensional checking (for example, does the pipe size match the flange size?). Currently, available systems deal with symbols, not dimensions.

2. Data base management systems need to be considered when examining software portability. (Portability is as much a factor as programing language.)

The system payback appears very short. Estimates ranged from less than a year to 18 months. In addition, 80% of the benefits may result from implementing 50% of a system. Therefore, care should be taken to avoid implementing any portions of a system that are not cost effective.